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Analysis of cataclysmic variable GSC02197-00886 evolution

Mitrofanova A., Borisov N., Shimansky V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We present the spectral analysis of the physical state and evolution of the WZSge-type cataclysmic variable GSC02197-00886. The spectra of the system, covering the total orbital period at the time of the outburst on May 8, 2010, at the late relaxation stage, and in the quiescent state, were obtained at the SAO RAS 6-m BTA telescope in 2010-2012. From the absorption and emission HI, He I, and Fe II lines, we have determined the radial velocities for all the nights of observations and constructed the maps of Doppler tomography for the quiescent state. It was found that during the outburst the spectra of the object were formed in an optically thick accretion disk with an effective temperature of T eff ≈ 45 000 K and in a hotter boundary layer. During the relaxation of the system, the accretion disk gradually became optically thinner in the continuum and in the emission lines. In the quiescent state (July 2012), the continuous spectrum was dominated by the radiation of the cooling white dwarf with T eff = 18 000 K. The emission lines are formed on the surface of the cool star by the X-ray irradiation of the 1RXSJ213807.1+261958 source. We propose a method for determining the parameters of the white dwarf, based on the numerical modeling of the system spectra in the quiescent state and their comparison with the observed spectra. It is shown that the effective temperature of white dwarf has decreased by ΔT eff = 6000 K during the relaxation from August 2010 to July 2012. We have obtained a set of parameters for GSC02197-00886 and shown their good agreement with the average parameters of the W Z Sge-type systems, presented in the literature. © 2014 Pleiades Publishing, Ltd.

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Keywords

GSC02197-00886, novae, cataclysmic variables, stars: dwarf novae, stars: individual